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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/715,927	11/17/2000	Leonard I. Zon	1242.1035-002	6132

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EXAMINER

WEGERT, SANDRA L

ART UNIT	PAPER NUMBER
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1647

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/715,927

**Applicant(s)**

ZON ET AL.

**Examiner**

Sandra Wegert

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 46, 47, 52, 54-60, 62, 65, 67, 69-72, 140, 143-146, 148 and 149 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 46, 47, 54-60, 62, 65, 67, 70-72, 135, 138, 140, 143, 145, 148 and 149 is/are allowed.
- 6) ☒ Claim(s) 52, 69, 135, 138, 144 and 146 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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**Detailed Action**

***Status of Application, Amendments, and/or Claims***

The Amendment, submitted 14 January 2005, has been entered. Claims 52, 57, 67, 69 and 148 are amended. Claims 1-45, 48-51, 53, 61, 63, 64, 66, 68, 73-134, 136, 137, 139, 141, 142, 147 and 150-156 are cancelled.

Claims 46, 47, 52, 54-60, 62, 65, 67, 69-72, 135, 138, 140, 143-146, 148 and 149 are under examination in the Instant Application.

The text of those sections of Title 35, U.S. Code, not included in this action can be found in a prior Office action.

**Withdrawn Objections And/or Rejections**

***35 USC § 112, first paragraph-Scope of Enablement***

The rejection of Claims 148 and 149, under 35 USC § 112- first paragraph, is *withdrawn* based on Applicant's arguments. This rejection was made at pages 5 and 6 of the previous Office Action (17 September 2004) over methods of detecting allelic variants of SEQ ID NO: 5 or 7.

***35 USC § 112, first paragraph-Written Description***

The rejection of Claims 134, 148, 149, 152, 153 and 154, for lack of written description is *withdrawn*. Applicants cancelled Claims 134, 152 and 154 and amended claims 148 and 149

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to recite reference to SEQ ID NO: 7 as the comparison DNA in the methods (17 September 2004).

***35 U.S.C. 112, second paragraph:***

The rejection of Claims 49, 51, 52, 69, 152 and 153 as indefinite for reciting "stringent conditions" or "highly stringent conditions," is *withdrawn*. Applicants cancelled Claims 49, 51, 52 and 153 and amended remaining claims to recite specific hybridization conditions supported by the instant Disclosure (14 January 2005).

The rejection of Claims 67, 70 and 71 as indefinite for reciting subject matter which may encompass naturally-occurring nucleic acids, is *withdrawn*. Applicants amended the independent claim to insert the qualifier "recombinant" (14 January 2005).

The rejection of Claim 140, for reciting a species that possibly encompasses a genus (Ferroportin-1 genus encompassed by SEQ ID NO: 6 species), is *withdrawn*. Applicants amended the claim to remove reference to the genus (14 January 2005).

**Maintained Objections and/or Rejections**

***35 USC § 112, first paragraph-Scope of Enablement***

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Claims 52, 69, 144 and 146 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the nucleic acids of SEQ ID NO: 5 and 7, as well as methods of making and using said nucleotides, does not reasonably provide enablement for nucleic acids with indeterminate sequence identity to SEQ ID NO: 5 or 7. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The claims are directed to cDNA and genomic DNA encoding a human iron transporter polypeptide. The specification discloses human, mouse and Zebrafish iron transporters and uses the Zebrafish transporter to measure iron flux across *Xenopus* oocytes transfected with the polynucleotide(s) encoding the transporter. The specification also discloses methods for recombinantly expressing the disclosed transporter polypeptides. The human and mouse polypeptides have approximately 82 and 89% similarity to the Zebrafish iron transporter, respectively. Additionally, the Applicant's post-filing-date reference demonstrates that the human Ferroportin transporter functions similarly to the Zebrafish iron transporter (Montosi, et al, 2001, J. Clin. Invest., 108(4): 619-623). The specification discloses an enabled utility for the polypeptide encoded by the DNA of SEQ ID NO: 1, as to be used to transport iron across the plasma membrane of cells expressing or transfected with the polynucleotide. Applicants have demonstrated, using transfected *Xenopus* oocytes, that the polypeptide encoded by SEQ ID NO: 1 is a transmembrane transporter. Furthermore, by performing the iron flux experiments in the presence and absence of an iron chelator, they have demonstrated that the transporter binds and translocates iron exclusively and with high-affinity.

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However, the scope of the patent protection sought by the Applicant as defined by the claims fails to correlate reasonably with the scope of enabling disclosure set forth in the specification for the following reasons:

There is no discussion, or working examples disclosed in the instant case, as to what amino acids are necessary to impart or maintain the functional characteristics of the claimed polynucleotide(s). This is because, in the case of Claims 52 and 69, the claims require the DNA *complement* to have a transporter function, rather than the Ferroportin coding sequence, while in Claims 144 and 146, no functional requirements are listed.

The instant case claims altering the polynucleotide(s) encoding the polypeptide of SEQ ID NO: 6, in indeterminate ways- e.g., in ways that may produce a non-functioning polypeptide. However, as discussed in the previous Office Action (pages 4-6, 17 September 2004) the art shows that transporter families have members with high structural similarities but disparate functions. For example, Bisson, *et al* (1993, Crit Rev Biochem Mol Biol, 28:259) studied yeast transporter knockout phenotypes, and found little correlation between homology and the substrate transported. They determined that the yeast transporters *Gal2* and *Hxt4* displayed 83.7% homology, similar to the transporters in the instant Specification, but *Gal2* appears to transport Galactose, while *Hxt4* appears to transport Glucose (based on knockout phenotype- compare Table 1 and Table 2A). Similarly, Liang et al found that several single amino acid substitutions in yeast glucose transporters can also change substrate specificity (Liang, H., et al (1998) Mol. Cell. Biol. 18(2): 926). These studies demonstrate that it is not predictable which amino acids are necessary to maintain the functional characteristics of a protein, and that relatively small changes in a coding sequence could result in a protein with a different function.

Due to the large quantity of experimentation required to: determine how to make and use all encompassed variants of SEQ ID NO: 5 and 7, including those that do not have an iron transport function; the lack of direction or guidance in the specification regarding same; the lack of working examples to all possible variants of SEQ ID NO: 5 and 7; the state of the art showing the unpredictability of function based on structural similarity of transporter polypeptides; and the breadth of the claims which embrace innumerable variants of SEQ ID NO: 5 and 7-- undue experimentation would be required of the skilled artisan to make and use the claimed invention in its full scope.

***Claim Rejections- 35 USC § 102***

The rejection of Claims 135 and 138 under 35 U.S.C. 102(b) is *maintained*. This rejection was previously made at pages 10 and 11 of the previous Office Action (14 September 2004) over Dodsworth, et al (1995, Accession No. HS153B8F). Dodsworth, et al claim a polypeptide sequence which is approximately 37% identical to SEQ ID NO: 7 and 34% identical to SEQ ID NO: 5 in the instant application. In particular Accession No. HS153B8F is identical to the reference sequences at bases 237-476. Applicants have argued that Dodsworth, et al, teaches the full-length sequence, not the short fragments. However, even though the claims read on 15-20 nucleotides, the contiguous portion of the claimed sequence need not be, because it reads on any short fragment that has a dinucleotide in common with SEQ ID NO: 7 ("comprising a contiguous portion").

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***Conclusion***

Claims 52, 69, 144 and 146 are rejected. Claims 46, 47, 54-60, 62, 65, 67, 70-72, 135, 138, 140, 143, 145, 148 and 149 are allowable.

**Advisory information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sandra Wegert whose telephone number is (571) 272-0895. The examiner can normally be reached Monday - Friday from 9:00 AM to 5:00 PM (Eastern Time). If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Brenda Brumback, can be reached at (571) 272-0961.

The fax number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SLW  
5 July 2005

  
JANET ANDRES  
PRIMARY EXAMINER